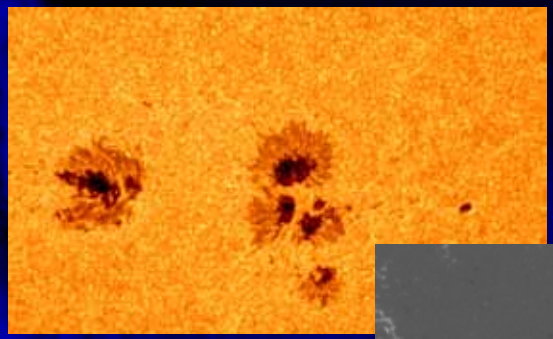
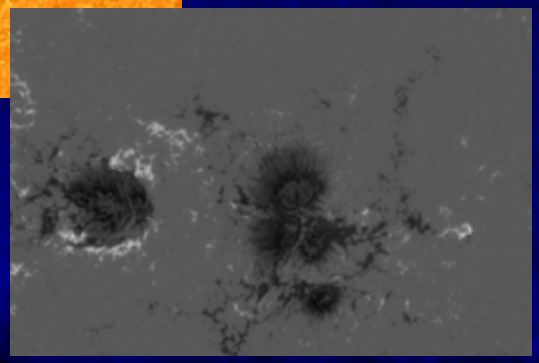
National Aeronautics and Space Administration

Hinode (Solar-B)
Discovering Details of the Solar Atmosphere: Photosphere to Corona

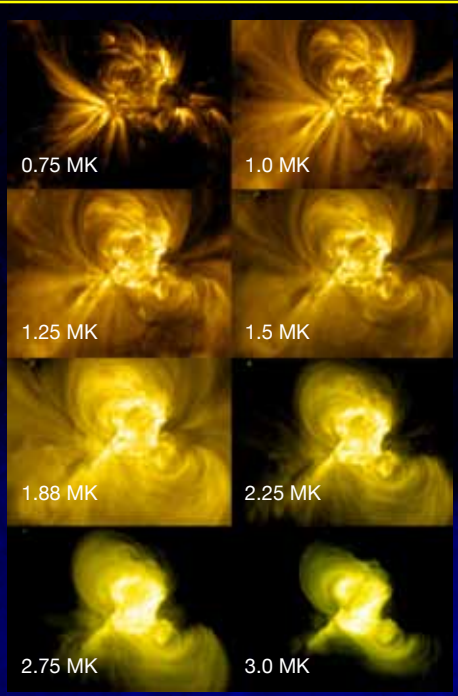
Hinode's three instruments, the Solar Optical Telescope (SOT), the Extreme Ultraviolet Imaging Spectrometer (EIS), and the X-ray telescope, are capable of making measurements in multiple layers of the solar atmosphere at the same time. This capability allows scientists to follow events as they propagate from the solar photosphere to the corona. Hinode's SOT has a spatial resolution of 0.2 arcsec – 0.3 arcsec (144 km – 217 km) over a range of wavelengths from 388.0 – 688.0 nm.

Sunspots and their Magnetic Field





On December 2, 2006 this group of sunspots, seen in the photospheric layer of the solar atmosphere were observed with the SOT. The image on the left is a "G-band" image, at 430 nm. The National Oceanic and Atmospheric Association (NOAA) numbered this sunspot group Active Region (AR) 10926. The image to the right shows the result of measuring the polarization of the light from the sunspots that originates in the photosphere at a wavelength of 630.2 nm. The polarization information allows a determination of the so called "Stokes Parameters," leading to the calculation of a region's magnetic field. The displayed data show the amount of circular polarization, which is proportional to the magnetic field strength; the colors in the image indicate positive (white) and negative (black) polarities of the magnetic field. Studying the magnetic field of sunspots has led to a better ability to predict solar flares.



The Solar Corona at Many Temperatures
EIS observes the Sun from 10,000 K to over 1,000,000 K (1 MK). The above (from left to right, top to bottom) false-color images were created as a result of Hinode observations of coronal emission at the following wavelengths:

Fe VIII at 19.5 nm and Fe X at 18.5 nm
Fe XI at 19.3 nm and Fe XII at 19.5 nm
FeXIII at 20.2 nm and Fe XIV at 27.4 nm
Fe XV at 28.4 nm and Fe XVI at 26.3 nm

The polar crown prominences in the background, were observed by SOT on November 30,2006 in the light of Calcium II-H (396.8 nm). Continuously flowing high above the chromosphere, these filaments of gas are at temperatures of 10,000 K, but they are embedded in regions of the corona where the temperature is 1,000,000 K. Blue was chosen for the prominence color because the observations are from the blue end of th e visible spectrum. Data for this image were provided, courtesy of Dr. Thomas Berger, Lockheed Martin Solar and Astrophysics Laboratory, and the Hinode/SOT Team.